

DOCUMENT RESUME

ED 253 401

SE 045 364

TITLE Mathematics--An Approach for Slow Learners. Section 1--Structure and Place Value. Notes for Teachers of Mathematics, Volume 6.

INSTITUTION Leeds Education Authority (England). Mathematics Curriculum Study Group.

PUB DATE Jun 78

NOTE 11p.; For related documents, see SE 045 363-367.

AVAILABLE FROM Leeds City Council Department of Education, John Taylor Teachers Centre, 53 Headingley Lane, Leeds LS6 1AA England (.24 pounds).

PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS Educational Games; Elementary Education; *Elementary School Mathematics; Foreign Countries; *Learning Activities; Low Achievement; Manipulative Materials; *Mathematics Instruction; *Number Concepts; Resource Materials; *Slow Learners; *Teacher Developed Materials

IDENTIFIERS England; *Place Value (Mathematics)

ABSTRACT

This is one of a series of monographs developed by teachers in elementary schools near Leeds, England. This document focuses on structure and place value. Slow learners in particular need concrete experiences designed to introduce and later consolidate the idea of place value, and with this in mind several activities proven successful with slow learners are presented. In the section on structure of number, children are introduced to the basic idea of grouping in tens using materials whose physical properties determine their value. In the other section, the true idea of place value is demonstrated--value now depends not upon any physical property of the materials but entirely upon the position in which counters, beads, and later, numerals are placed. (MNS)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

NOTES FOR TEACHERS OF MATHEMATICS

ED253401

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

This document has been reproduced as
received from the person or organization
originating it.

Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official NIE
position or policy.

VOL 6

MATHEMATICS -

AN APPROACH FOR SLOW LEARNERS

SECTION. 1

STRUCTURE AND PLACE VALUE

LEEDS EDUCATION AUTHORITY

MATHEMATICS CURRICULUM STUDY GROUP

THE JOHN TAYLOR TEACHERS' CENTRE

"PERMISSION TO REPRODUCE THIS
MATERIAL IN MICROFICHE ONLY
HAS BEEN GRANTED BY

R.S. Johnson

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

SE 045 364

MATHEMATICS CURRICULUM STUDY GROUP

VOL. 6 - MATHEMATICS - AN APPROACH FOR SLOW LEARNERS

SECTION 1 - STRUCTURE AND PLACE VALUE

Members of the Working Party

Chairman: Mr J.D. Slater	Calverley Parkside J.I.School
Mr R. Arnold	Advisory Division
Mrs J. Barstead	Oulton Infants School
Mrs D. Clarkson	Churwell Primary School
Mrs B. Finely	Oulton Infants School
Miss J. Jack	Harehills Primary School
Mrs E. Jackson	Upper Armley C.of E.Primary School
Mr K. D. Lewis	Stourton J.I. School
Mrs M. Lilley	Rothwell C.of E. Primary School
Mr D. Neaber	East End Park E.S.N.(M) School
Mrs B. Nelson	Lower Wortley Primary School
Miss E. Pearsall	Advisory Division
Mr A.G.D. Saxton	John Taylor Teachers' Centre
Mr R. G. Tym	Westfield Primary School
Mrs B. Walker	Beechwood Primary School
Mr C. Winch	Morley Newlands J.I. School

Any comment on content or presentation would be welcome.
Please send them to the Mathematics Adviser, Advisory
Division, Dudley House, Albion Street, Leeds LS2 8PT.

June 1978.

STRUCTURE AND PLACE VALUE.

Our number system is one of man's greatest inventions. To record any number, however great or small, using only nine symbols plus zero as a place holder is a remarkable example of applied economy.

The place value system which makes all this possible is a basic mathematical idea which all children should understand if computation is to be undertaken with both accuracy and understanding. The difficulty the concept presents to children should not be underestimated and from the outset a realistic approach will be required. Less gifted children in particular will require concrete experience designed to introduce and later consolidate the idea of place value and with this in mind several activities, which have proved successful in the teaching of the slower learner, are detailed below in the hope that they will be of assistance in the classroom.

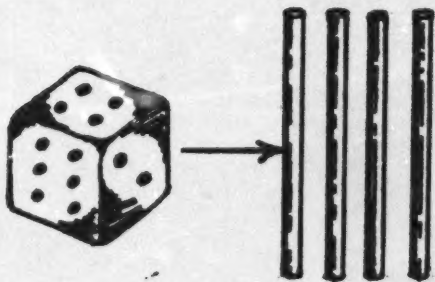
The activities are developed under two main headings:

1. **STRUCTURE OF NUMBER.** In this section children are introduced to the basic idea of grouping in TENS using materials, the physical properties of which determine their value, and
2. **PLACE VALUE.** Here the true idea of place value will be demonstrated; value now depending not upon any physical property of the materials used but entirely upon the position in which counters, beads and later numerals are placed.

S T R U C T U R E

Stage 1. Making Tens.

A simple introductory game using straws and a 'dot' die.

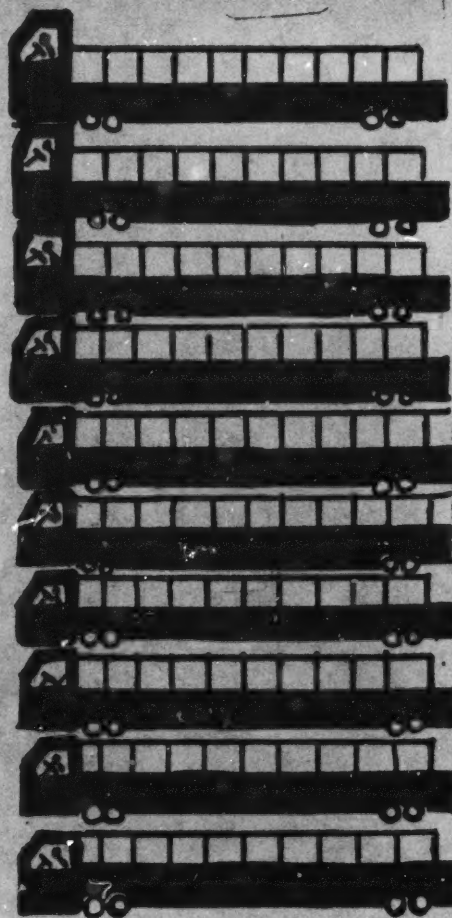
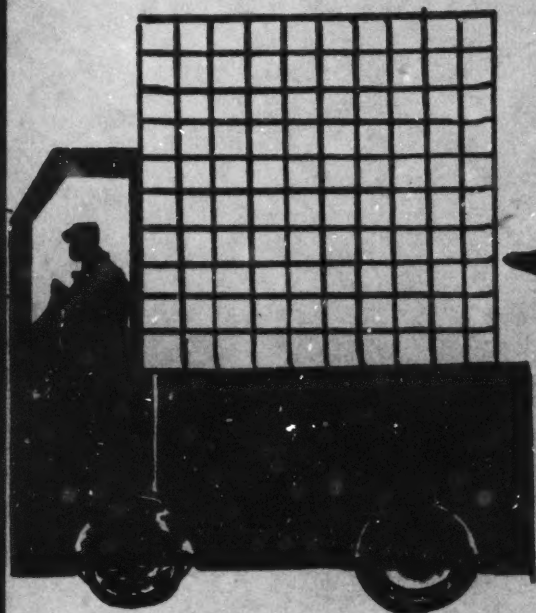


Here children take turns at throwing the die and collecting the number of straws corresponding with the value thrown. As the game proceeds children bundle their straws in TENS the winner being the first child to assemble a pre determined number of 'TEN' bundles.

Stage 2. Tens and More Tens.

A 'dot' die and base ten structural apparatus (Tillich's, Dienes, Multibase etc) together with four base boards similar to the following illustration will be required for this activity.

Tens and More Tens.



Instructions for playing the game are as follows:

Children take turns at throwing the dot die, recording their score by placing 'unit' pieces on each of the small lorries. Each time the TEN small lorries are loaded the pieces are removed and exchanged for one 'long' which in turn is used to fill a lorry in the centre column.

Play and exchange continues until all TEN lorries in the centre column are loaded. The ten 'longs' are then removed and exchanged for one 'flat' which will load the HUNDRED lorry. The first child to reach this stage is the winner.

The reverse process commencing with a loaded HUNDRED lorry and decomposing step by step until all the lorries are empty and all pieces removed may also be undertaken.

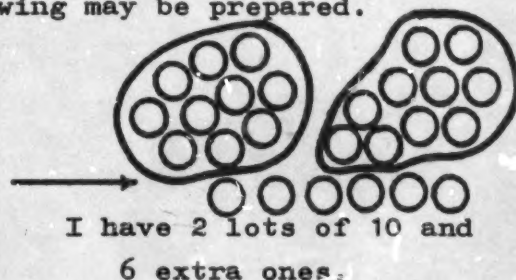
Stage 3. The Tillichs Game. This game for up to four players is offered by E. J. Arnold & Son Ltd., Leeds, for use with their Tillichs apparatus but may also be used for all base ten structural materials. This is a more sophisticated presentation of the Tens and More Tens game and the rules are the same. Again children are involved in multiple exchange of 'ten' groupings as the structure of our number system is demonstrated.

Although we traditionally speak of Tens and Units it was considered that Tens and Ones might well be clearer for the slower learner in the early stages. This, however, is a matter of choice for the individual teacher.

Stage 4. 'Ten penny groups'

Using coins for ten groupings is an alternative activity and simple workcards such as the following may be prepared.

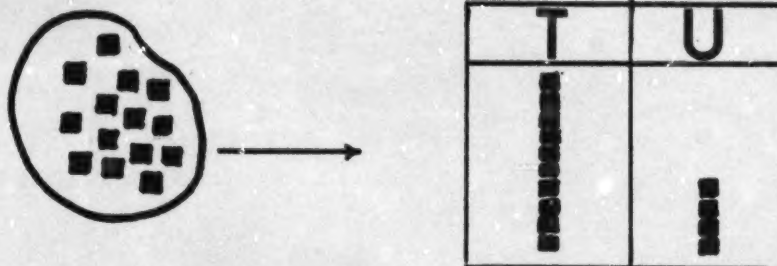
Take twenty-six pennies.
Put them into groups of ten.
Draw them.
Write about them.



Stage 5. Unifix - Tens and Units trays.

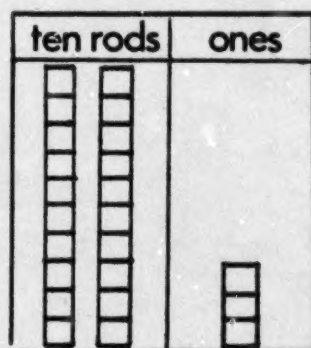
Ten grouping activities using Unifix or other linking cubes.

Random groupings of cubes may be assembled and shown in Tens and Units column.



Stage 6. Early recording. Tens and Ones.

Cards are prepared featuring diagrams of structural apparatus arranged in 'tens' and 'Ones' columns. Children write the number shown on each card.



→ There are **2** tens and **3** ones.

Reverse presentation: The children are provided with blank cards and apparatus and make a 'picture' of given numbers.

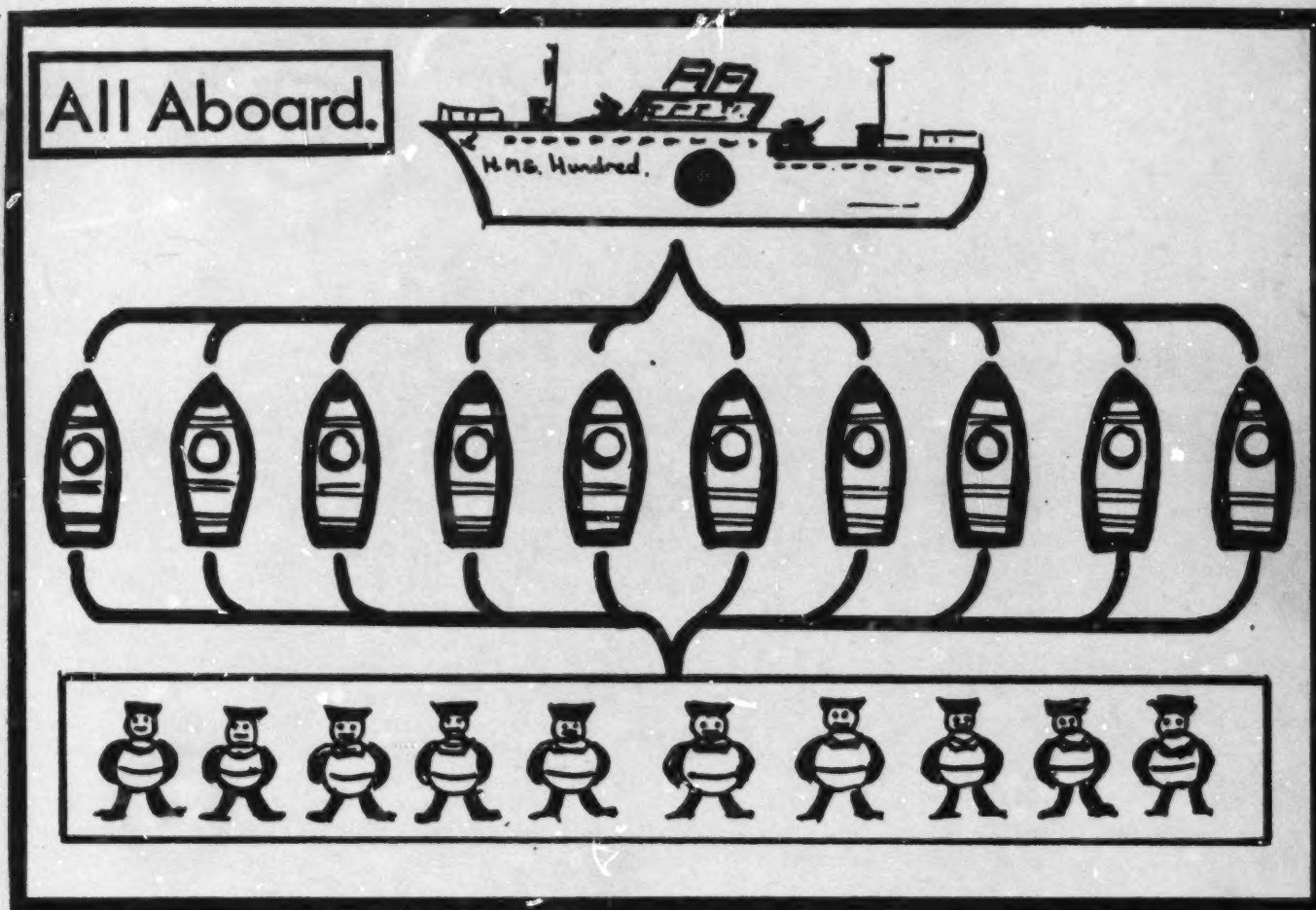
← Show **2** tens and **3** ones.

PLACE VALUE

Stage 1. Introductory Game, 'ALL ABOARD'

This game is designed to demonstrate multiple regrouping in tens using identical objects (counters) which may record one, ten or one hundred according to the position in which they are placed. Number is no longer related to the physical property of the materials used and true Place Value begins.

A number die, counters and base boards similar to the one illustrated below will be required.



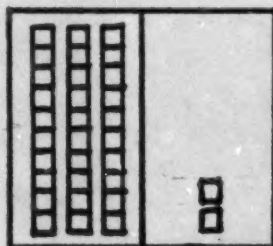
Instructions for playing the game are as follows:

Children shake the number die in turn placing one counter on each sailor to show their score. When all sailors have a counter the TEN counters are removed and one counter is placed on a boat showing that the boat is full. Shaking and exchange continues until all TEN boats are full. The ten counters are then removed and one counter, representing ONE HUNDRED sailors is placed on H.M.S. Hundred. The first player to fill his or her ship is declared the winner.

Stage 2. Place Value word cards.

A. Cards showing number structure and on the reverse side corresponding values shown by identical objects positioned in Tens and Units columns. Children record, in figures, the number shown.

Example:

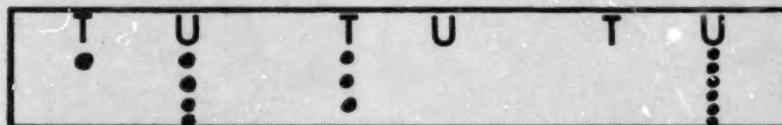


tens	ones
● ● ●	● ●

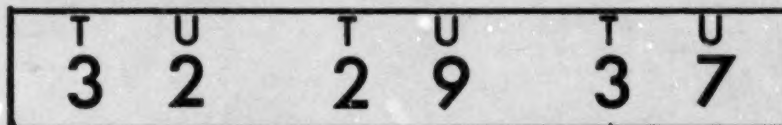
B. Place Value. Greater than - less than activity.

Children draw or write the greatest number.

Example 1

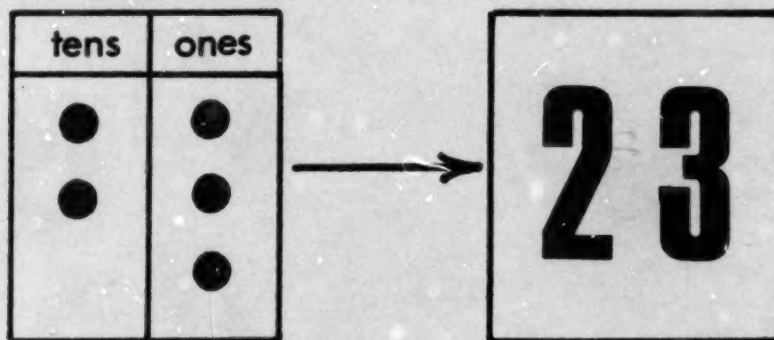


Example 2



Stage 3. Place Value Snap Cards. Tens and Units Notation.

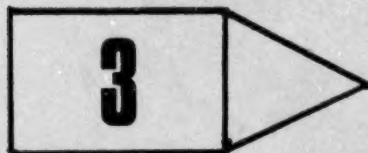
Here formal recording in tens and units is consolidated as children are required to match number values in the form of diagrams to corresponding notation to Base 10. The range of values included will be determined by the teacher but it is suggested that cards be repeated within each pack in order to maintain interest as the game proceeds.



Stage 4. Place Value Strips.

The strips are made in card as illustrated below.

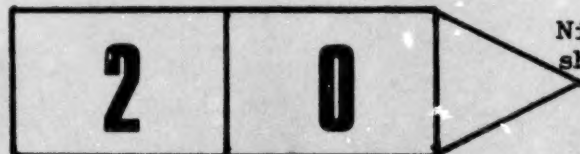
Unit
Strips



Nine unit strips will be required showing the following values:

1, 2, 3, 4, 5, 6, 7, 8, 9.

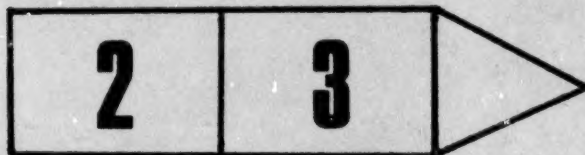
Tens
Strips



Nine tens strips will be required showing the following values.

10, 20, 30, 40, 50, 60,
70, 80, 90.

The teacher calls out a number e.g. 23. The children pick out the appropriate cards and place them in the correct position. This will happen when the points are put together.



The tens and units cards correctly positioned to record 23.

Later work will extend to hundreds and thousands. Use of the strips demonstrates the function of the symbol zero as a place holder.

Stage 5. Number recording cards. Hundreds, tens and units.

A large base card marked as shown will be required together with a supply of small numeral cards 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

h	t	u

Numbers are called out by the teacher and the children are required to register the number by placing numeral cards in the correct columns.

e.g. Three hundred and fifty six.

h	t	u
3	5	6

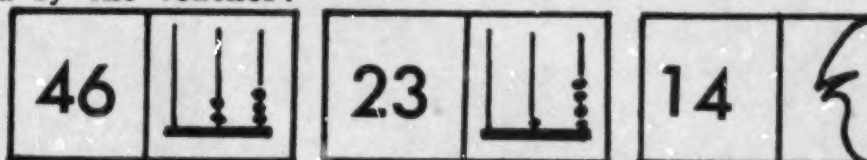
Stage 6. Consolidation games.

A. Place Value Dominoes.

Twenty eight card dominoes are prepared linking abacus pictures to notation in standard form.

The hundreds, tens and units values included will be determined by the teacher.

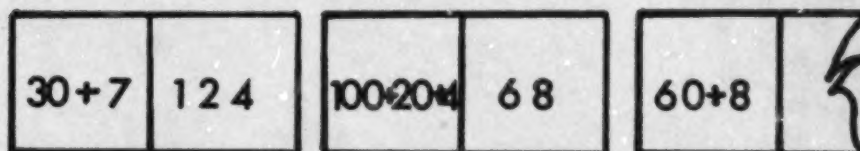
Example:



B. Notation Dominoes.

Twenty eight dominoes are prepared linking standard notation to number expressed in expanded form. Rules of play as for traditional dominoes.

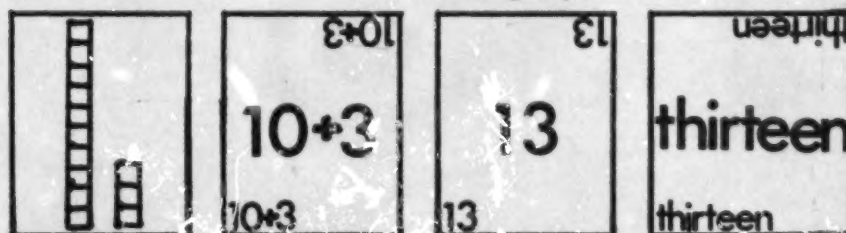
Example:



C. Notation Playing Cards.

Fifty two cards are required in matching groups of four as illustrated below. Matching groups of four should be repeated within the pack to facilitate 'flow' of play.

Example:



Instructions for playing the Notation Card Game:

Children are required to collect a set of four cards displaying corresponding values expressed in the form of diagrams, expanded numerals, standard notation and words (see illustration).

The 52 cards are shuffled before each game.

Each player is dealt FIVE cards, the remaining cards being placed in a face down remainder pack on the playing surface. The top card of this remainder pack is then turned over giving a double choice of exchange as the game proceeds.

Players take turns at picking up one card of known or unknown value from either remainder pack. This card is exchanged for any unwanted card held, the rejected card being placed on the 'face up' pack each time.

Play continues until any player gains a complete set of FOUR corresponding values and is declared the winner.

The cards may also be used in the manner of traditional 'SNAP' until all cards are held by any one player.

The following are some suggested pieces of equipment and materials that are useful in the development of an understanding of the structure of our number system and place value.

A. Apparatus/Equipment List

1. Arnold's Nine-Nine-Nine Board.
2. Cuisenaire 'ten' and 'unit' rods.
3. Colour factor 'ten' and 'unit' rods.
4. Dienes (Base 10) Tillicks (Base 10) Unifix.
5. Adding to one hundred game: Philip & Tacey (Philograph)
6. One - Twenty number matching cards: Philip & Tacey.
7. Hoop abacus: Taskmaster.
8. Subtraction abacus: Invicta.
9. Manual hand calculator.
10. Hand Tally.

B. Materials (particularly for making workcards)

1. Unifix album of gummed squares: Philip & Tacey.
2. Unifix rubber stamps: Philip & Tacey.
3. Coloured area grid paper: Philip & Tacey.
4. Squared paper.
5. Straws.
6. Rubber bands.
7. All kinds of dice.
8. Waddington's blank playing cards.
9. Key symbols for Sasco year planner: Tapp & Toothill.